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The Influence of Social and Environmental Support on Diabetes Self-Management

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Abstract

Background

The reduction of diabetes complications depends on adherence to self-management behaviors. The current study was designed to examine the influence of multiple social-environmental levels of support on diabetic self-management behaviors in a lower income community. The eight distinct levels of social-environmental support studied were personal characteristics, physician and health team, family and friends, neighborhood, community, media and policy, community organizations, and the workplace.

Methods

An anonymous self-administered survey, consisting of questions about demographic features, hemoglobin A1C, self-management behaviors, and perceived support from multiple social-environmental levels, was completed by 36 diabetic participants from the Regions Family Physicians clinic.

Results

Significant associations were found between: 1) higher personal disease management/coping and adherence to general diet, specific diet, foot care, and medication recommendations, 2) higher perceptions of support from family and friends and adherence to specific diet and foot care, and 3) higher levels of neighborhood support and regular exercise.

Conclusions

Multiple social-environmental factors influence adherence to diabetic self-management behaviors in lower income populations. The influence of these factors needs to be recognized and addressed in order for diabetic interventions to be effective.

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Chapter 1: The Problem

Introduction

Diabetes is a highly prevalent chronic illness in the United States that poses challenges to both medical professionals and public health officials. Over the past decade the number of people with diabetes has increased dramatically. From 1990 to 2000 the number of adults in the U.S. diagnosed with diabetes increased by 49 percent (Center for Disease Control (CDC) a., 2002). Currently, it is estimated that 11.1 million people have been diagnosed, while another 5.9 million people are suspected to have diabetes but are not yet diagnosed (CDC a., 2002).

The prevalence and burden of diabetes, mainly type 2, is greatest in certain racial/ethnic groups, lower income populations, and the aging population. Currently in the United States approximately 7.8 percent of all non-Hispanic whites, 13.0 percent of non-Hispanic blacks, 10.2 percent of all Hispanic/Latino Americans, and 15.0 percent of American Indians and Alaska Natives have diabetes (CDC b, 2003). Nearly 20.1 percent or 7.0 million people aged 65 and older have diabetes (CDC b, 2003). In industrialized countries and the United States, a low socioeconomic status is associated with a higher prevalence of type 2 diabetes (Robbins, Baccarino, Zhang & Kasl, 2001).

Type 2 diabetes, which accounts for 90-95% of diabetics, usually develops sometime after the age of 40 years. Behavioral elements such of the increased intake of high fat diets, decreased physical activity, and obesity in combination with demographic changes (increase in racial/ethnic minorities and aged individuals) are increasing the risk and prevalence of the disease (U.S. Department of Health and Human Services (HHS), 2000). Individuals with type 2 diabetes develop insulin resistance, where their body is no

longer able to efficiently use insulin, and gradual deterioration of insulin production by their pancreas. Unlike people with type 1 diabetes, who have acute symptoms when their insulin production rapidly declines due to autoimmune destruction of insulin producing cells in the pancreas, people with type 2 diabetes can have the disease for many years without any symptoms. Often individuals with type 2 diabetes have evidence of diabetes complications present at diagnosis.

Long-term complications of untreated diabetes can be devastating. As a result of the damaging effect of high glucose levels on the body, individuals with diabetes may develop retinopathy with the potential loss of vision; nephropathy leading to renal failure; peripheral neuropathy with risk of foot ulcers and amputation; autonomic neuropathy causing gastrointestinal, genitourinary, and cardiovascular symptoms and sexual dysfunction (American Diabetes Association (ADA), 2003). In the United States, diabetes is the leading cause of new cases of blindness among adults aged 20-74 years old, end-stage renal disease, and lower-limb amputations (CDC b., 2003). Hypertension and lipid abnormalities, in combination with diabetes, contribute to the higher rates of cardiovascular disease in individuals with diabetes. Adults with diabetes have a two to four time greater risk of death from heart disease and stroke than adults without diabetes (CDC b., 2003).

Individuals from certain racial and ethnic communities, including African American, Hispanics, American Indians, and certain Pacific Islander and Asian American populations as well as economically disadvantaged individuals, suffer disproportionately from diabetic complications compared to white populations (HHS, 2000). For example,

deaths from diabetes in the African American population are two times higher than they are in the white population (CDC b., 2003).

Diabetic complications and other diabetes-related health problems cause decreased quality of life, substantial disability, and enormous health care costs (HHS), 2000). Nearly, 132 billion dollars a year is spent on the direct and indirect (due to disability, work loss, or premature mortality) costs of diabetes (CDC b., 2003). The cost of health care is much greater for patients with diabetes as opposed to those who are not diabetic. For example, the average health care cost for a person with diabetes in 1997 was $10,071, compared to $2,699 for a person without diabetes (CDC a., 2002).

Extensive evidence demonstrates that the long-term complications and economic burdens associated with diabetes can be prevented with diabetes management interventions. According to the results of the Diabetes Prevention Program (DPP), the progression to type 2 diabetes can be prevented in individuals, who are at an increased risk, with lifestyle changes (e.g. moderate exercise and healthy diet) (Diabetes Prevention Research Group, 2002). The 58 percent risk reduction for developing type 2 diabetes was seen for both Caucasian (55 percent of participants) and minority participants (20 percent African American, 16 percent Hispanic, 5 percent American Indian, and 4 percent Asian American).

In individuals diagnosed with diabetes, control of blood glucose levels has been shown to reduce long-term complications. Two prospective randomized clinical trials have proven that diabetics who maintain their blood glucose levels near a normal range (HbA1C < 7%) sustained decreased rates of microvascular complications such as retinopathy, nephropathy, and neuropathy (Diabetes Control and Complications Trial

(DCCT) Research Group, 1993; United Kingdom Prospective Diabetes Study Group (UKPDS), 1998). In general, for each 1% reduction of HbA1C toward normal glycemic levels the risk of developing microvascular complications is reduced by 40% (CDC b., 2003). Presently, however, less than half of persons with type 2 diabetes in the United States have ideal glycemic control (Harris, Eastman, Cowie, Flegal, & Eberhardt, 1999).

The risk of cardiovascular disease, which is the major cause of mortality and a major contributor to the direct and indirect cost of diabetes in persons with diabetes, can be reduced with controlling blood pressure, managing lipid levels, smoking cessation, and anti-platelet therapy (ADA, 2003). According to the UKPDS, lowering blood pressure to a mean of 144/82 significantly reduced strokes, diabetes-related deaths, heart failure, microvascular complications, and visual loss (ADA, 2003). Lowering LDL cholesterol and triglycerides and increasing HDL cholesterol is associated with a 20-50 percent reduction in cardiovascular complications (CDC b., 2003).

Early detection of microvascular disease and treatment can reduce the development of more severe complications. Regular annual eye exams for diabetic retinopathy and laser treatment can reduce vision loss. Screening for microalbuminuria, which provides an early indication of nephropathy, and treatment with ACE inhibitors or Angiotensin-receptor blockers (ARBs) can reduce the rate of end stage renal disease (ADA, 2003). The potential need for amputation can be prevented by taking preventative measures against foot ulcers and by wearing good footwear (ADA, 2003).

Background

Diabetes self-management is the cornerstone to diabetes management aimed at prevention of diabetes and its complications (ADA, 2002). Self-management behaviors,

which are adopted by individuals with diabetes, are essential for successful control of blood glucose, blood pressure, and lipid levels. Examples of self-management behaviors include proper use and adjustment medications, following an appropriate eating plan, engaging regularly in exercise, self-monitoring blood glucose, not smoking, examining one's feet at regular intervals, and attendance to clinic to meet with health care providers.

Unfortunately for most diabetics, incorporating these self-management tasks is difficult and adherence is low (Glasgow and Eakin, 1998; Jack, Liburd, Vinicor, Brody, & Murry, 1999). It has been consistently found across numerous studies that individuals with diabetes most regularly follow their medication regimen and least regularly follow recommended lifestyle changes for diet and exercise (Ruggiero et al., 1997; Toobert, Hampson & Glasgow, 2000).

Diabetes self-management education (DSME) programs have been shown to be effective at improving health outcomes and increasing levels of self-management. In a large review of the results of 72 randomized controlled trials on effectiveness of self-management training in type 2 diabetes, it was found that in the short term (less than six months) self-management training positively impacted knowledge, frequency and accuracy of self monitoring of blood glucose, self-reported dietary habits, and glycemic control (Norris, Engelgau & Narayan, 2001). Interventions that combined educational and behavioral strategies (such as empowerment, support groups, counseling, problem solving, goal setting, and behavioral modification) improved self-management and health outcomes better than either strategy alone (Brown, 1999).

Recently, there has been increased recognition of the importance of developing diabetes self-management education (DSME) interventions that are effective at

transferring the benefits of DSME interventions to minority and economically disadvantaged populations. Developing appropriate diabetes care and specially adapted education programs is critical to reduce the prevalence and burden of diabetes complications seen in these populations (HHS, 2000; Eakin, Bull, Glasgow & Mason, 2002).

Traditional DSME interventions, which have approached diabetes self-management as if the were dependent only on patient characteristics such as knowledge, health beliefs, and metabolic factors, or on the characteristics of providers and health care programs, are inadequate for lower socioeconomic and minority populations (Glasgow et al., 1998). The traditional approach fails to recognize and address potential barriers to self-management experienced by diabetics from lower socioeconomic communities. Examples of these barriers as stated in the review by Eakin et al. (2002) include: economic barriers to care, especially in fee-for-service systems, cultural beliefs that mitigate against taking a greater role in self-management, limited access to transportation, multiple care-taking roles and limited access to childcare, and increased prevalence of mental health and substance abuse disorders.

Several researchers have proposed that a social-ecologic approach that recognizes influences on self-management from multiple social-environmental levels (individual, family and friend, health care provider, community, neighborhood, and pubic policy) is needed to identify barriers to self-management (Auslander & Corn, 1996; Glasgow & Eakin, 1998; Glasgow et al., 1999; Jack, Liburd, Vinicor, Brody, & Murry, 1999; Eakin et al., 2002). According to Jack et al. (1999), the extent diabetic researchers recognize the impact of an individual's environmental context may also affect the extent we are

able to reach specific populations. For Glasgow et al. (1999), understanding social and environmental influences is important since they have the potential to influence large numbers of diabetic individuals simultaneously. Aspects of each level of influence can support or serve as barriers to diabetic self-management as illustrated in table 1.

Table1*

Factors Supporting and Interfering with Diabetes Care and and Self-Management at Each Level of Influence

Level of Influence	Supportive Factors	Inhibitory Factors
1. Personal	Empowerment; High self-efficacy; Good problem solving skills	Lack of Knowledge; Low self-efficacy; depression
2. Family/Significant Other	Social support; Shared exercise and eating patterns	Nagging or lack of involvement; Poor role models
3. Health Care Provider/System	Integrated, systems approaches; Collaborative goal setting; Surveillance and follow-up support; Outreach and proactive contacts	Lack of reimbursement or insurance coverage; Inconsistency among different team members; Lack of access to care
4. Worksite/School/ Organization	Smoking policies; Availability of nutritious foods; Flexible schedules; Physical activity resources and opportunities	Lack of control over schedules; Embarrassment; Lack of privacy for glucose testing or insulin injection; No accommodation to diabetes needs; Low priority on wellness
5. Neighborhood/ Community	Awareness and use of nutrition, physical activity resources; Support groups; Strong library and volunteer programs	Lack of nutrition education or self-management resources; Lack of safe, convenient exercise locations
6. Regulatory, Policy, and Incentive	Taxes on tobacco products; Labeling information on food; Media coverage of seriousness of diabetes and related topics; Outcomes report cards for health care plans and clinics	Automobile-oriented society; Media that do not consider diabetes serious; Lack of reimbursement for education and self-management supplies; Denial of health insurance

* (Glasgow, Wagner, Kaplan, Vincor, &Smith, 1999)

In minority and economically disadvantaged populations, social-environmental influences on many levels can profoundly affect the adoption of diabetes self-management behaviors. Previous studies have identified numerous influences on self-management for particular populations (i.e. the problematic issue of low self-esteem, including the confidence to adopt healthy behaviors among Native Americans; influence of spirituality, general life stress, multi-care giving responsibilities, and psychological

impact of diabetes in African Americans; and influence of family characteristics on disease management in Hispanic and European-American patients) (Hood, Kelly, Martinez, Shuman & Secker-Walker, 1997; Samuel-Hodge et al., 2000; Fisher et al., 2000).

More distant influences from environmental levels such as the workplace, community organizations, neighborhood, public policy, and media on diabetic self-management have been studied little due to their complexity and the lack of instruments to measure their influence.

Recently Glasgow, Stryker, Toobert, and Eakin (2000) developed a multi-level pyramid model of social-environmental support (Figure 1) and an instrument called the Chronic Illness Resources Survey (CIRS) to assess support and resources for chronic illness management on multiple levels. This instrument makes it possible for the influence of these more environmental levels on self-management to be studied. A more systematic evaluation of the individual and combined social-environmental influences on self-management on multiple levels experienced by diabetic individuals from specific minority and lower socioeconomic communities is needed (Eakin et al., 2002).

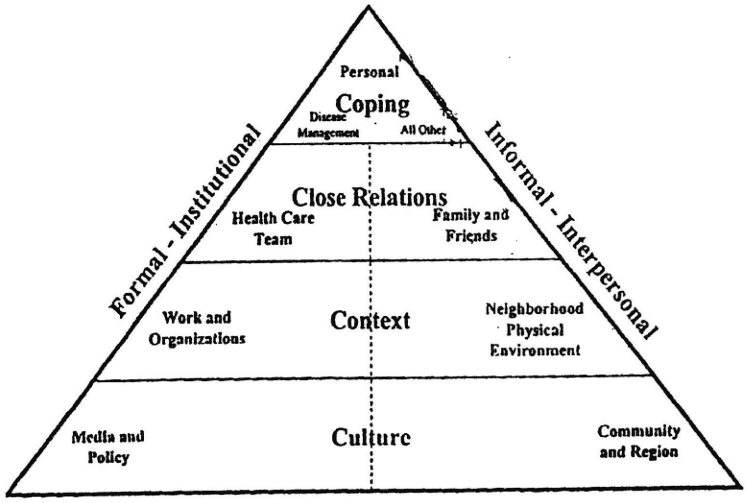

Fig. 1. Pyramid of social-environmental support.

Certain social-environmental levels of influence may affect specific self-management behaviors more than others. For example, having access to affordable exercise facilities in a community may influence how often a diabetic individual from that community exercises. The effect of comparative and combined influences on multiple social-environmental levels on certain self-management behaviors and glycemic control in lower income populations has not been studied.

Statement of the Problem

Getting diabetics in lower income and underserved communities to engage more frequently in self-management activities is a major goal of public health officials and diabetes researchers. Diabetics who maintain good glycemic control through adherence to self-management are at less of a risk for developing complications associated with diabetes. Understanding the social and environmental influences on multiple levels that act to promote or prevent diabetes self-management in lower income communities and their effect on the adoption of self-management behaviors needs to be further studied.

The purpose of this research was to study the influence of comparative and combined support on multiple social-environmental levels on diabetic self-management and glycemic control in an economically disadvantaged community. The eight distinct levels of social-environmental support that were studied included personal disease management characteristics, the physician and health team, family and friends, neighborhood, community, media and policy, community organizations, and the workplace. Research on this topic sought to answer the following questions:

1. How much support for self-management do diabetics seen at a clinic in a lower socioeconomic community experience on multiple social-environmental levels?

2. Is there a relationship between the comparative effects of each social-environmental level of support and certain diabetes self-management behaviors?
3. Is there a relationship between the comparative effects of each social-environmental level of support and glycemic control?
4. What is the relationship between the combined effects of multiple levels of social-environmental support and the adoption of diabetic self-management behaviors?
5. What is the relationship between the combined effects of multiple levels of social-environmental support and glycemic control?

Significance of Study

Understanding the effect of supportive and inhibitory influences on diabetes self-management from multiple social-environmental levels is extremely important in directing diabetes care and education efforts to improve the adoption of self-management. For diabetes interventions to be successful, they must address social and contextual issues experienced in the daily lives of individuals with diabetes (Eakin et al., 2002). A social-ecological approach to program development considers the influences of culture, community, and spirituality and emphasizes the importance of intervening at multiple levels with multiple strategies (Aulander et al., 1996; Glasgow et al., 1999; Eakin et al., 2002). Some examples may include linking patients to community resources, having interventions in community settings, health system changes, policy interventions, and the creation of incentives for participation and maintenance of self-management (Eakin et al., 2002).

The HealthPartners Pursuing Perfection Initiative for diabetes and the chronic care model was support for this study. The goals of this research were important to the

Regions Family Physicians clinic, the site where this research was conducted. Currently, the clinic is striving to improve diabetes care for their patients. The majority of diabetic population seen at the Regions Family Physicians clinic is economically disadvantaged. Therefore, findings of this research may provide insight into how diabetic self-management can be promoted through diabetic interventions in lower socioeconomic areas.

Definitions of Terms

Diabetes: Diabetes mellitus is a chronic illness characterized by disruptions in blood glucose metabolism that results in hyperglycemia. As stated previously in the introduction, there are two primary types of diabetes, type 1 and type 2. People with type 1 diabetes, which accounts for 10% of diabetics, usually develop the disease in childhood or young adulthood. Type 2 diabetes, which accounts for 90-95% of diabetics, usually develops sometime after the age of 40 years. The focus of this research is on adults over the age of 18, who have been diagnosed with type 1 or type 2 diabetes mellitus. A majority of the patients from the study population have type 2 diabetes.

Environmental support: According to Glasgow et al. (2000) a person's environmental context incorporates influences from a person's community, neighborhood, workplace, and public policy. Cumulative human experience with situations such as housing conditions, racism, occupational hazards, employment status, availability of quality health care, community violence and acculturation can create barriers to disease self-management (Jack et al. 1999). Several supportive environmental factors have been identified through previous diabetes research (Glasgow et al., 1999). Some of these supportive environmental factors, included in table 1, include smoking policies, flexible

work schedules, physical activity resources, community support programs, and media coverage of the seriousness of diabetes related topics.

Glycemic control: Maintaining blood glucose levels within a certain range is referred to as glycemic control. People with diabetes monitor their blood glucose usually one to four times a day and adjust their dietary intake, activity, and/or diabetic medications accordingly. The recommended blood glucose range for diabetics before meals is 90-130 mg/dl and before bedtime is 110-150 mg/dl (ADA, 2002). Doctors and heath professionals use the hemoglobin A1C (HbA1C), a common diabetic lab value, to determine how well a person's blood sugars have been controlled over the past 3-4 months. Non-diabetics have an HbA1C range between 4-6%. The HbA1C goal for diabetics is <7% (ADA, 2002).

Self-management: Self-management refers to the full range of activities diabetics engage in to promote their health, augment their physical, social, or emotional resources, and prevent adverse effects from their diabetes (Pincus, Esther, DeWalt & Callaghan, 1998). Based on previous debate (Glasgow & Anderson, 1999; Lutfey & Wishner, 1999) and a general consensus by the American Diabetes Association the use of "self-management" is preferable to the terms "compliance" or "adherence" (ADA, 2002). The use of the terms "adherence" and "compliance" is counterproductive because they both construe the problem to be with the patient and fail to recognize the multidimensional nature of adherence behaviors (Anderson, 1985; Lutfey et al., 1999; Glasgow, Wilson, & McCaul, 1985). According to Glasgow and Anderson (1999) the use of the term "self-management" fosters an appropriate collaborative approach between diabetic patients and

their health providers and recognizes that diabetic patients themselves are responsible and in control of the self-management of their diabetes.

Social ecologic approach: The social ecological approach offers a theoretical framework for understanding the dynamic interplay among persons, groups and their sociophysical milieus. It integrates a "person focused efforts to modify persons' health behavior with environment-focused interventions to enhance their physical and social surroundings" (Stokols, 1996).

Social Support: The definition of social support used in diabetes research most commonly refers to the support an individual receives from their family, friends, and health care providers. In a review by Langford, Bowsher, Maloney, & Lillis (1997), the four most frequently used attributes of social support were emotional (e.g. providing empathy, caring, love, and trust), instrumental (e.g. aid in kind, money, labor, time, modifying environment), informational (e.g. advice, suggestions, directives, and information), and appraisal (e.g. affirmation, feedback, and social comparison). Toljamo & Hentinen (2001) found that diabetics who had emotional and instrumental support from family and friends adhered better to self-management.

Assumptions and Limitations of the study

The results of this study should be interpreted in light of a few limitations. First, diabetic patients who attended the Regions Family Physician clinic over a two month period were asked to participate. This means that patients who were asked to participate were more likely to adhere to diabetic self-management tasks. For the population of diabetic patients at Regions Family Physicians, just getting patients to come to their diabetic appointments tends to be an issue. Other methods for selecting participants were

not chosen due to limited resources of time and money. Despite this limitation, the information gained from completing with the study with diabetics who attend the clinic is valuable.

Second, participation in this study was limited to diabetic patients at Regions Family Physicians who were literate in English. The questionnaires were printed only in English. In order to minimize disruption in clinic flow and due to limitations in resources, interpreters were not used for participants who were not English speaking. This may have limited individuals from certain minority ethnic groups from participation in this research.

Diabetic participants in this research self-reported how frequently they completed self-management activities and their perceptions of the social and environmental support they have received. Although self-report is by far the most practical and cost-effective, it may be open to bias. Patients may exaggerate how often they performed certain self-management tasks. This is known as responding in a socially desirable manner. For instance, a patient might respond that they exercised more often in a given week than what they actually did. The Summary of Diabetic Self-Care Activities measure according to its authors was found to be subject to some social desirability bias (Toobert. Hampson, & Glasgow, 2000). Therefore, an adjustment for response set bias needs to be included in the interpretation of the results. According to the authors of the Chronic Illness Resources Inventory (CIRS), none of the CIRS scales were significantly correlated with socially desirable responding as measured by either of the two scales derived from the abbreviated version of the Balanced Inventory of Desirable Responding (Glasgow et al., 2000).

Conclusion

Maintaining glycemic control through diabetes self-management activities is critical for the prevention of serious diabetes complications. African American, Hispanic, American Indian, Asian, and economically disadvantaged populations have a high prevalence of type 2 diabetes and are at high risk for diabetic complications. Creating interventions effective at improving adoption of self-management behaviors in these populations is dependent on assessment and understanding of social and environmental influences on multiple levels that act to promote or inhibit diabetes self-management. Currently, the influence of multiple levels of social and environmental support on the adoption of diabetes self-management behaviors is not well understood. This study investigated the influence of comparative and combined support on multiple levels of social-environmental levels on several diabetic self-management behaviors and glycemic control in an economically disadvantaged community.

Chapter 2: Literature Review

Getting diabetics in lower socioeconomic and minority communities to engage more frequently in self-management activities has become a major goal of public health officials and diabetes researchers. Diabetics who maintain good glycemic control through frequent self-management are at less of a risk for developing complications associated with diabetes. Understanding the social and environmental influences on multiple levels that act to promote or prevent to diabetes self-management in lower income communities and their effect on the adoption of self-management behaviors needs to be further studied in order to guide creation of effective interventions promote diabetes self-management.

Diabetes self-management behaviors

Extensive research of diabetic self-management behaviors using various scales has provided much insight into patterns of adherence by individuals with diabetes. There are numerous scales that have been developed to measure self-management behaviors (Glasgow et al., 2001). The most common self-management behaviors measured by scales were diet, exercise, blood glucose monitoring, and taking medications. Measuring levels of adherence of self-management across various tasks are commonly used by researchers to measure of the success of a Diabetes Self-Management Education (DSME) program or new intervention strategy.

Studies involving self-management behaviors as an outcomes have shown that overall diabetics have difficulty incorporating self-management behaviors into their daily lives and adherence is low (Glasgow et al., 1998; Jack et al., 1999). Individual self-management behaviors do not correlate highly with each other (Orme & Binke, 1989;

Peyrot & Rubin, 1994; Glasgow et al., 1998). Just because a particular diabetic patient for instance takes his or her medications does not mean this same patient will regularly exercise. It has been consistently found across numerous studies that individuals with diabetes most regularly follow their medication regimen and least regularly follow recommended lifestyle changes for diet and exercise (Ruggiero et al., 1997; Toobert et al., 2000).

Both perceived barriers and problems with adherence tend to be greatest for self-management activities that demand behavioral changes in lifestyle such as healthy diet patterns, exercise, or not smoking (Glasgow et al., 1998; Orme et al., 1989; Peyrot et al., 1994). In a study of low-income diabetic patients, exercising or following a planned diet was difficult or extremely difficult for the majority of respondents despite a majority indicating they understood those same components of self-management pretty well (Anderson, Balkrishnan, Camacho, Bell, Duren-Winfield & Goff, 2003). More directed self-care behaviors such as checking blood glucose and taking medications as prescribed were difficult for four-tenths to one-half of respondents (Anderson et al., 2003).

The Summary of Diabetes Self-Care Activities Measure. The Summary of Diabetes Self-Care Activities (SDSCA) measure is a brief self-report questionnaire of diabetes self-management that includes assessment of the following aspects of the diabetes regimen including: general diet, specific diet, exercise, blood-glucose testing, foot care, medication, and smoking (Toobert et al., 2000). The diabetic respondents report on the frequency with which they preformed various activities over the last seven days. For example one of the questions asks, "How many of the last SEVEN days have you followed a healthful eating plan" (See Appendix A). The SDSCA has been widely

used and was recently revised from the original SCSCA measure to include items on foot care and smoking (Toobert et al., 2000). The SDSCA was selected to be used in this research project to measure the levels of self-care management across different components of the diabetes regimen.

Self-Management behaviors and HbA1C. There is some variance in the literature regarding the relationship between self-management behaviors and hemoglobin A1C (HbA1C), which is a measure of the average blood glucose levels over the previous three months. Several studies have shown that diabetics who neglect their self-care behaviors tend to have poorer metabolic or glycemic control (Tolijamo et al., 2001; Glasgow et al., 1997; Hentinen & Kyngas, 1992; Ruggireo et al., 1997). According to a review by Glasgow et al. (2001), the correlation between self-management behaviors and HbA1C in most studies was low. These authors suggested that the use of medications is likely causing the relationship between HbA1C and self-management behaviors to become insignificant. Body weight, another commonly used diabetic outcome, has been more consistently associated with self-management behaviors.

Reducing health disparities

The prevalence and burden of diabetes, mainly type 2, is greatest in certain racial/ethnic groups, lower income populations, and the aging population. Reducing the prevalence of diabetes and unnecessary complications of diabetes in these populations has recently become a focus of public health officials and of several diabetes researchers.

Disparities exist among racial/ethnic groups and higher versus lower socioeconomic status in the rate of diabetes and its associated complications. Certain racial and ethnic communities, including African American, Hispanic, American Indian,

Asian, and economically disadvantaged populations suffer disproportionately compared to middle to upper class white populations. The relative numbers of persons with diabetes from these minority communities is one to five times greater than in white communities (CDC b., 2003). Diabetes related deaths, diabetes-associated renal failure, and other diabetes related complications are often higher for minority groups, especially African Americans, than for whites (CDC b., 2003).

Extensive evidence demonstrates that type 2 diabetes and the long-term complications associated with diabetes can be prevented with diabetes management interventions (Diabetes Prevention Research Group, 2002, DCCT Research Group, 1993; UKPDS, 1998). Inadequate access to proper diabetes prevention and control programs and improper quality of care provided through diabetes services that are accessed is contributing to the increased diabetes burden experienced by minority and lower socioeconomic populations (HHS, 2000). Current diabetes programs and DSME interventions need to be adapted to better overcome barriers to self-management faced by minority and lower socioeconomic populations.

Multiple efforts to reduce diabetes health disparities are underway in the United States. For example, the National Diabetes Education program (NDEP) is collaboration between the National Institutes of Health (NIH) and the Centers for Disease Control and Prevention (CDC) and over 200 private public and voluntary groups to promote early diagnosis of diabetes and improvement of treatment for those with both type 1 and type 2 diabetes (Clark, Fradkin, Hiss, Lorenz, Vinicor & Warren-Boulton, 2001). A program, also sponsored by the CDC, called Racial and Ethnic Approaches to Community Health (REACH) is an effort to distribute funds to communities throughout the US to increase

efforts to promote prevention of chronic illness, including diabetes, among racial and ethnic minority groups (http://www.cdc.gov/diabetes/projects/reach.htm). Healthy People 2010, which is co-lead by the CDC and NIH, has set fourth numerous goals and objectives for diabetes management and prevention programs. The program's main goal for all persons at risk for diabetes is to reduce the disease and economic burden of diabetes and improve the quality of life for all persons at risk for diabetes (HHS, 2000).

Social-ecological approach

Developing appropriate diabetes care and specially adapted education programs is critical to reduce the prevalence and burden of diabetes complications seen in minority and lower socioeconomic populations (HHS, 2000; Eakin et al., 2002). Traditional DSME interventions, which have approached diabetes self-management as if it was dependent only on patient characteristics such as knowledge, health beliefs, and metabolic factors, or on the characteristics of providers and health care programs, is inadequate for lower socioeconomic and minority populations (Glasgow et al., 1998). The traditional approach fails to recognize and address potential barriers to self-management experienced by diabetics from lower socioeconomic communities. Several researchers have proposed that a social-ecologic approach that recognizes influences on self-management from multiple social-environmental levels (personal, family and friend, health care provider, community, neighborhood, media, and pubic policies) needs to be applied to care of diabetes patients and the development of interventions (Auslander et al., 1996; Glasgow et al., 1998; Glasgow et al., 1999; Jack et al., 1999; Eakin et al., 2002). Taking a social-ecological approach involves attempting to understand the social and environmental factors that interfere with certain self-management behaviors, rather

than labeling the patient as being non-compliant (Glasgow et al., 1998). With a chronic illness such as diabetes, a patient's experience with situations such as housing conditions, racism, occupational hazards, employment status, availability of quality healthcare, availability of healthcare coverage, community violence, family and social network, and acculturation significantly influences self-management choices and behaviors (Jack et al., 1999). In order to produce lasting behavioral change, a patient's social environment must be addressed in diabetes interventions and plans made for ongoing support of self-management behaviors (Glasgow et al., 1998; Eakin et al., 2002).

Social-Environmental Influences

Social-environmental influences on multiple levels can promote or create barriers to diabetic self-management behaviors. This section provides a review of several studies that have examined the influence of certain aspects of the social environment on diabetic self-management and glycemic control.

Personal disease management characteristics. Several personal disease management characteristics have been found to be predictive of higher levels of diabetic self-management. These characteristics can be grouped into personality traits, styles of coping, and personal beliefs about illnesses. Diabetic patients with personalities characterized by greater self-efficacy or self-perceived capability to carry out a behavior are more likely engage in that behavior. Aljasem, Peyrot, Wissow, & Rubin (2001) found that perceived barriers were associated with worse diet and exercise. Greater self-efficacy predicted more frequent blood glucose testing, less frequent skipping of medication and binge eating, and closer adherence to diet. In a study by Toobert and Glasgow (1994) the ability to cope and deal with chronic stress through the use of

problem-focused strategies by was found to be linked to the display of positive and consistent self-management behaviors. Finally, several studies have demonstrated that the way diabetics see and understand their illness impacts how often they seek medical treatment, adopt recommended treatments and incorporate them into everyday life (Fisher et al., 1998). Studies have found that diabetic patients tend to be more attentive and concerned about controlling symptoms and maintaining a sense of well-being than they are about metabolic control (Fisher et al., 1998). Stresses and life commitments of individuals with diabetes can compete with recommendations about self-management behaviors.

Support from family and friends. Many studies have investigated the role of social support or lack of support on diabetic regimen adherence and glycemic control. Until recently few of these studies have looked at the relationship between social support and adults with type 2 diabetes. Of the specific types of social support identified, support from family members and friends has been most consistently found to be associated with self-management behaviors (Albright, Parchman, & Burge, 2001; Fisher et al., 1998; Wang & Fenske, 1996). In a study by Wang et al. (1996) diabetics who had received support from family and friends had significantly higher self-care behaviors than those without support. Receiving emotional and instrumental support from family and friends in a study by Toljamo et al. (2001) protected against neglect of self-care.

The family has been described as the having the most pervasive, most long-lasting effect on its members, and the most influence on the management of type 2 diabetes (Fisher et al., 1998). Family characteristics, behaviors and routines can facilitate or interfere with diabetes regimens (Schafer, McCaul, & Glasgow, 1986). Family

characteristics that are most significantly linked to self-management vary by patient ethnicity (Fisher et al., 2000). African American adults with diabetes rely more heavily on informal social networks than whites (Ford, Tilley, & McDonald, 1998). Studies have demonstrated that disease management occurs best in families with "good organization, low spouse conflict, high cohesion, few economic problems, high stability of membership, low interpersonal criticalness, high marital satisfaction, and good intergenerational boundaries" (Fisher et al., 1998). Several studies have suggested that assessing family characteristics and including family members in the process of diabetes management process is important (Albright et al., 2001; Fisher et al., 1998).

Doctor and health care team. The doctor-patient relationship, physician beliefs and attitudes, and who provides the diabetic education have all been found to be significantly correlated with successful patient self-management behaviors (Fisher et al., 1998). Interactions between patients and their providers that were characterized by high degrees of patient involvement, patient control and information seeking, and expression of emotion by the patient and their provider have been correlated with positive clinical outcomes (Fisher et al., 1998; Thorne & Paterson, 2001). Patients across many diseases rate advice from their doctors as one of the most important influences on health protective behaviors such as smoking cessation (Glasgow et al., 1998).

Community and neighborhood. Of the several levels of influences on self-management, the least attention by health professionals and diabetes researchers has been given to more distant levels, such as community, neighborhood, media, and public policy. These more distal levels are important since they impact larger numbers person simultaneously (Glasgow et al., 1998). They look beyond the care of the individual to the

health needs of an entire community or population of persons with diabetes (e.g. in a given practice, health system, or state) (Glasgow et al., 1999).

The community and neighborhood in which individuals with diabetes live can affect health behaviors. According to the ecologic or biopsychosocial model, health behaviors are a function of the reciprocal effects of individual, family, health care system and community factors (Haire-Joshu, 1996). The community is the environmental context of individuals who may share similar values, culture, social groups, economies and institutions. Churches, volunteer associations, schools, neighborhood groups, and extended family networks are components of community that can enhance health status. Community features that can have adverse effects on health include poverty, crime, unemployment, gang violence, and drug and alcohol abuse (Haire-Joshu, 1996). The effect of these adverse features tend to cluster and influence health status exponentially rather than additively.

Brody, Jack, Murry, Landers-Potts & Lindburd (2001) developed a heuristic model that examined how community barriers and supports, availability and use of insurance, diabetes education, medical provider-patient relationships, extended family processes, and psychological functioning impacts self-management in African Americans. These authors proposed that community characteristics such as structural barriers (i.e. unavailable exercise facilities or public transportation), crime and violence, racism, social support, and religious involvement may indirectly influence self-management of diabetes through its impact on depression, anxiety, and family conflict.

Workplace, media, and public policy. Supportive or inhibitory influences present in the workplace/school, public policy, and media can impact diabetic self-management.

In the workplace/school exercise programs, the availability of nutritious foods, flexible schedules, and policies against smoking have been shown to have the largest positive effects on employee/student health (Glasgow et al., 1998). Lack of reimbursement for education and self-management supplies and the denial of health insurance can negatively affect the health of diabetics (Glasgow et al. 1999). The tremendous influence of media in promoting convenient high-fat foods, sedentary lifestyles, and tobacco use on health behaviors is just beginning to be recognized (Stauber & Rampton, 1995; Stokols, 1996).

The Chronic Illness Resources Survey (CIRS). Recognizing social-environmental influences on diabetes self-management and having a way to measure and study them is critical. Recently, Glasgow, Stryker, Toobert, and Eakin (2000) developed a multi-level pyramid model of social-environmental support based on the social-ecologic model (Figure 1) and an instrument called the Chronic Illness Resources Survey (CIRS) to assess support and resources for chronic illness management on seven levels (e.g. personal, family and friends, physician/health team, neighborhood/community, organizations, worksites, and media and policy). The development of the CIRS allows multiple combined and comparative levels social-environmental influences on self-management to be studied. In this research study the 29-item Brief CIRS (Appendix A) was used to measure diabetic patient perceptions of

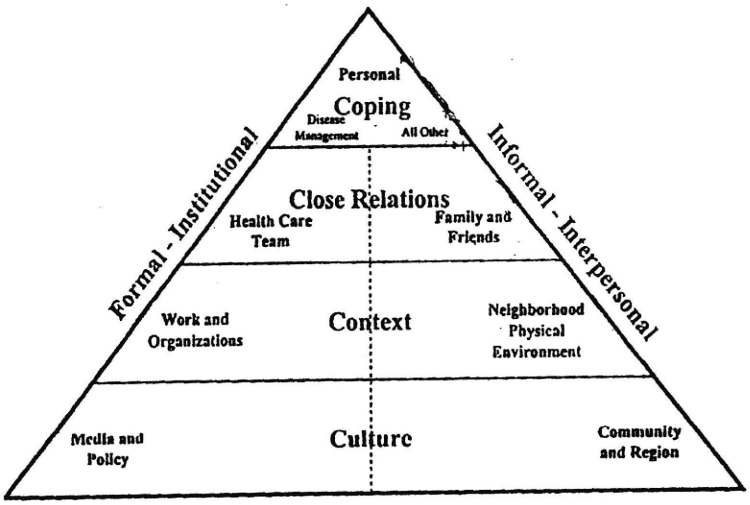

Fig. 1. Pyramid of social-environmental support.

support and resources for self-management from multiple social-environmental levels in a lower income community. Initial results during validation of the CIRS instrument revealed that personal disease management was found to be important for dietary management; health care team support was important for medication adherence; and neighborhood/community resources and support were important predictors of quality of life (Glasgow, 2000).

Interventions in lower income and minority populations

Recently a review of diabetes self-management interventions aimed at disadvantaged populations (i.e. racial and ethnic minorities, low-literacy, low-income, and older adults) was completed by Eakin et al., (2002). A majority of the studies reviewed focused on ethnic or racial minorities and emphasized the social-ecological approach to program development. The importance of incorporating traditional foods and food preparation into existing programs, meeting people in convenient locale, and incorporating social and family support were some examples of issues considered by authors of the studies reviewed. Attendance to group-based meetings, which was used by most of the studies reviewed, was extremely variable due to many barriers. These barriers included lack of transportation, limited financial resources, limited access to childcare, increased likelihood of dealing with substance abuse, and mental health issues, if not for themselves, then for family members (Eakin et al., 2002). The authors of the review concluded that more systematic evaluation of social-eccologic factors impacting health in disadvantaged communities is needed along with multi-leveled interventions that address those factors. Additional research is needed to identify how diabetes self-management is mediated by an individual's social and physical environment.

Summary

A major goal of diabetes management is to get diabetics to actively engage in self-management. There are multiple social and environmental levels of influence that can impact adherence to diabetic self-management. Influences from patient characteristics, support from family and friends, and support from the relationship between the patient and the health care team have been found to be associated with diabetic self-management behaviors. The relationship between more distant environmental sources of influence such as the community, neighborhood, work, media, and public policy and diabetic self-management behaviors is less understood. Understanding the influence of the combined and comparative support from these multiple levels may foster the development of new strategies to increase levels of diabetic self-management.

Chapter 3: Research Design and Methods

Design of Study

A quantitative, descriptive, non-experimental design was used to investigate the comparative and combined influences of multiple levels of social-environmental support on the diabetic self-management and glycemic control. This methodology was chosen since the purpose of the research was to describe characteristics of the types or levels of support and their effects on diabetic self-management. No variables, such as the amount of social-environmental support a particular diabetic patient experiences, were manipulated or altered.

Investigators

This research was conducted to fulfill the master thesis requirements of an Augsburg College physician assistant student. The student, Cheryl McKee, was responsible for the providing the research surveys and other forms, informing the staff at Regions Family Physicians (RFP) clinic about the nature of the research, data entry into the computer, data analysis, and describing the results. Peter G. Harper MD, MPH acted as the principal HealthPartners investigator for this research. Currently, Dr. Harper works at RFP clinic in Family Practice and is the clinic champion for both diabetes and the chronic care model. Dr. Harper advised Cheryl throughout the development of this research project and through its completion. He oversaw the administration of surveys and collection process of HbA1C values at the RFP clinic.

The clinic manager at RFP clinic was involved in the planning of how to best integrate the data collection process at RFP in order to cause minimal disruption in clinic flow and use of clinic personal. A presentation was given by Cheryl McKee and Dr.

Peter G. Harper in April of 2003 to the nurses at the clinic in order to inform them about the nature of the study and to explain to them their role in the data collection process. Prior to the initiation of the data collection, a flier (Appendix B) with general information about the research and the collection process was placed in all provider and nurse mailboxes.

Completing this research at RFP clinic was appropriate for two main reasons. First, a collaborative relationship was established between the HealthPartners investigator, Peter G. Harper, and Cheryl McKee. Second, the clinic with Dr. Harper's leadership was striving to improve diabetic outcomes. Multiple obstacles were being encountered in motivating patients in the self-management behaviors and improving the overall glycemic control of the diabetic population. Therefore, understanding the perceptions of social-environmental support and its influence on self-management behaviors was needed to promote the further development of new strategies to improve self-management behaviors.

Subjects

The Regions Family Physicians (RFP) Clinic, a HealthPartners clinic, was the site where this research was conducted. The clinic had an adult type 1 and 2 diabetic patient population of about 250-300 patients. Greater than 90 percent of the patients seen at RFP had type 2 diabetes. The clinic was located on the east side of St. Paul in a lower socioeconomic area. The population of diabetics was mostly of Caucasian ethnicity. A minority of the population was made up of Hispanic, African American, Asian, American Indian or other ethnic groups.

Type 1 and Type 2 diabetic patients, who were English speaking, over the age of 18 years, and attended the Regions Family Physicians clinic for regular diabetic appointments or were having their HbA1C drawn, were invited to participate when being seen for a visit. Potential diabetic participants were identified by their nurse or provider and were invited to participate according to a provided script (Appendix C). If diabetic patients expressed an interest to participate, their nurse would go through an informational sheet with them (Appendix D). The informational sheet provided background information about the nature of the research, the tasks involved in participation, risks and benefits to participation, confidentiality, voluntary nature of the study, and contact information of the researchers.

Sample

On any given month about 30 to 40 diabetic patients attend the RFP clinic for their diabetic check-ups or to have their HbA1C drawn. Diabetics that attended the clinic over the months of June and July 2003 and had not previously taken part in the study were asked to participate following their visit with their clinician. The goal number of diabetic participants was 40 (50-60% of diabetics who attend the RFP clinic over a two month study period). It was anticipated that not all participants of the study would fully complete the survey and choose to have their HbA1C recorded. According to the central limit theorem, a sample size of at least 30 was needed in order for the distribution of the mean to be considered an approximation of a normal distribution. With at least 30 subjects, a normal distribution and z scores could be used to determine the range that includes the true population mean with 95% confidence. If at least 30 diabetics are in the sample population, then 10-12% of the diabetic patients at RFP clinic will be included in

this study.

Data Collection

An anonymous self-administered questionnaire (Appendix A) was used to gather information about relevant demographic features of the diabetic participants, how frequently they engaged in diabetic self-management activities, and about their perceptions of support on eight social-environmental levels. On the second page of the survey, diabetic participants were asked if they were willing to share their most recent HbA1C from their medical records. If they checked the box next to "yes", their nurse would record their most recent HbA1C from their medical chart and the date it was drawn (Appendix A). The glycemic control of the individual participants was assessed by their recorded HbA1C values.

Demographic features included in the survey were age, gender, race (optional), employment, household income, number of persons in household, and years diagnosed with diabetes. The 29-item brief version of the Chronic Illness Resources Survey (CIRS) was used with permission from its authors (Appendix E) to assess the multiple levels of social-environmental support experienced by the diabetic participants (Glasgow et al., 2000). Twenty-two items assessed perceptions of support and seven items assessed the importance of support (See Appendix A). The brief CIRS instrument was fairly internally consistency ($\alpha = .79$) and relatively stable (test-retest correlation of $r = .83$ at 1 month and $r = .65$ at 4 months (Glasgow et al., 2000). The total score from the brief CIRS scale correlated $r = .61$ ($p<.01$) with support from the self-monitoring logs. The survey was originally designed to assess support and resources for many chronic illnesses such as arthritis, diabetes, lung disease, and heart disease. It is based on a multilevel

"pyramid" model of social-environmental support (see figure 1) and developed by the authors of this survey (Glasgow et al. 2000, Glasgow et al., 1999, and Glasgow et al., 1998). The eight levels of support that were assessed included: personal disease management, doctor and health care team, family and friends, neighborhood, community, media and policy, community organizations, and work. Participants were asked to select the number on an 5 point ordinal scale that best represents their experience of social or environmental support from "Not at all" to "A great deal" over the past three months.

Two questions from the full CIRS instrument were included with the questions selected for the brief form CIRS instrument (See Appendix A). Under the "Community" level the following question was added, "Have you used public transportation to get somewhere you were going?" Transportation to the RFP clinic by diabetic patients was identified a common problem by clinic staff. Secondly, under the "Media and Policy" level the question, "Have you had health insurance that covered most of the costs of your medical needs including medications and diabetic supplies" was added. These questions were included since they seemed particularly relevant to the population of diabetics at RFP clinic.

The Summary of Diabetes Self-Care Activities (SDSCA) measure (Appendix A) was used with permission to measure levels of self-care or self-management across different components of the diabetes regimen (Toobert et al., 2000). The following diabetic self-care or self-management activities were included: general diet, specific diet, exercise, blood-glucose testing, foot care, medication, and smoking. The average inter-item correlations within scales were high (mean = 0.47), with the exception of specific diet; test-retest correlations were moderate (mean = 0.40). Correlations with other

measures of diet and exercise generally supported the validity of the SDSCA subscales (mean = .23). Diabetic patients reported on the frequency with which they preformed each self-care activity over the past seven days (Appendix A). For example one of the questions asks, "How many of the last SEVEN days have you followed a healthful eating plan".

The glycemic control of the diabetic participants was assessed from a recent hemoglobin AIC value recorded by the participant's provider or nurse (Appendix A). During analysis the actual HbA1c values were used in the form of continuous data.

Data Access and Privacy

No information that could identify the diabetic participants was present on the surveys or associated with the HbA1C value. In no location were the participants asked to provide their signature. On the second page of the survey in the instructions section (Appendix A), diabetic participants were asked to indicate whether they were willing to have their HbA1C recorded by their nurse or provider. If they checked the box marked "yes" then their nurse or provider recorded their most recent HbA1C value and the date the value was obtained. The completed surveys, which may or may not include a diabetic participant's most recent HbA1C, were kept in a secure location at the RFP clinic. Following the collection process, the RFP clinic retained the completed surveys and HbA1C values in a locked file at the clinic. Copies of non-identifiable data from the surveys were made available for data entry. Data entered into the computer for analysis was protected with a password.

Separate proposals for this research were submitted to the Augsburg College Internal Review Board (IRB) and the HealthPartners IRB. Notice of final approval from

the Augsburg IRB (see Appendix F) was received on December 17, 2002. The Augsburg IRB approval number was 2002-43-2. Notice of final approval from the HealthPartners IRB (Appendix G) was obtained in April of 2003. The HealthPartners IRB approval number was 03-003.

Data Analysis

Prior to analysis the data was screened for out-of-range value. Questions that were not answered were left blank in the data set. Descriptive analysis including frequencies and percents was calculated for each demographic characteristic. For the SDSCA measure, the mean number of days and the standard deviation for each subscale and for the entire measure was calculated. Eight CIRS subscales were created by computing the means of the subscale items (physician and health care team, family and friends, personal actions, community organizations, neighborhood, community, workplace, and media and public policy). The total CIRS support scale score was computed as the mean of all the subscale values. A Support x Importance subscale was created for each level by multiplying support level and importance ratings as described by the authors of the CIRS (Glasgow et al., 2000).

Relationships between demographic characteristics of the sample population (nominal data) and adherence to self management behaviors and perceptions of support on multiple social-environmental levels were evaluated. The individual and combined scores for each level of social-environmental support were the independent variables (ordinal data). The dependent variables included the average frequency of all the self-care tasks from the SDSCA measure (ordinal data) and the quality of glycemic control based on the HbA1C (continuous data). In order to test for correlation between the

multiple social-environmental levels of support and diabetic self-management behaviors and glycemic control, multiple variable analyses, using Pearson r (parametric date) or Spearman rho (non-parametric data) methods, were completed. The statistical package SPSS for Windows version 9.9 (SPSS, Chicago) was used to analyze the data.

Chapter 4: Results

Characteristics of the Study Participants

Table 1: Participant Characteristics

	Frequency (N=36)	Percent
Age		
18-39 years	6	16.7%
40-59 years	19	52.8%
60 or greater years	11	30.6%
Gender		
Male	17	47.2%
Female	19	52.8%
Race		
Caucasian	21	58.3%
Non-Caucasian	15	41.7
Employment status		
Full-time	14	38.9%
Part-time	2	5.6%
Homemaker	2	5.6%
Retired	7	19.4%
Other	11	30.6%
Household income		
Less than $30,000	26	86.7%
$30,000 or greater	10	27.8%
Number of persons in household		
Live alone	10	28.6%
2 persons	13	37.1%
3 persons	6	17.1%
4 persons	3	8.6%
5 or more persons	3	8.6%
Years diagnosed with diabetes		
0-5 years	17	47.2%
6-10 years	9	25.0%
11 or more years	10	27.8%
In Diabetes Group		
No	27	75.0%
yes	9	25.0%

Thirty-six diabetic patients from the HealthPartners Regions Family Physicians Clinic completed surveys. This was a 72% participation rate out of the fifty surveys made available for distribution at the clinic. All subjects were adults, English speaking, and had ages ranging from 18 to greater than 70 (see Table 1). There were slightly more women than men (52.8% women). Fifty eight percent of the diabetic participants were Caucasian. The majority of the participants indicated that their employment status was full-time or other (see Table 1). The majority (86.7%) of participants had an income of $30,000 or less. Most of the diabetic participants, who indicated they have an income above $30,000, had a greater number of persons in there household. Seventeen (45.9%) of the participants were diagnosed with diabetes zero to five years, nine were diagnosed six to ten years, and ten were diagnosed greater than eleven years. Nine of the diabetic participants completed the survey following a diabetes group clinic at Regions Family Physicians Clinic.

HbA1c

The mean HbA1C for the diabetic participants was 7.78 (SD=2.12). 46.9% of the diabetic participants had an HbA1C at the goal of <7%. A more detailed breakdown of HbA1C at various levels is included in Table 2.

Table 2: HbA1c levels in diabetic participants

HbA1c levels	Frequency	Percent
<7	15	46.90%
7.0-8.0	6	18.80%
8.1-9.9	7	21.90%
≥ 10	4	12.50%

Diabetes Self-Management

Table 3: Mean Level of Self-management (Number of days over the last week)

Self-management tasks	N	Min.	Max.	Mean	Std. Deviation
Diabetic Medications	36	0	7	**6.31**	1.98
Blood sugar monitoring	36	0	7	**5.83**	2.26
General diet	35	0	7	**4.61**	2.04
Foot care	34	0.5	7	**4.57**	2.10
Exercise	35	0	7	**3.90**	2.32
Specific diet	36	0	6.5	**3.64**	1.53

The levels of diabetes self-management varied across the specific self-management tasks (See Table 3). The higher the mean the more days in a week a specific self-management task was incorporated. Taking diabetic medications had the highest level of self-management followed by blood sugar monitoring, general diet (following a healthy eating plan), and foot care. Exercise and specific diet (eating five or more fruits and vegetables and/or avoiding high fat foods) had much lower levels of self-management. Twelve of the subjects (33.3%) responded they had smoked a cigarette in the last seven days.

Intercorrelations, using Person's bivarate analysis, were found between some of the specific self-management tasks. Diabetic participants, who reported a higher level of self-management to general diet, had higher reported levels of self-management to

specific diet (r = 495, p< .01). Higher levels of blood glucose testing was found to be positively correlated (both at p < .05) with both a higher level of self-management to general diet (r = .392) and exercise (r = .382).

Demographic features of the subjects were not significantly correlated with the level self-management across tasks with a few exceptions. The age of the diabetic participants was found to be positively correlated with the level of general diet self-management (Spearman's rho ρ=.462, p< .01). Older diabetic patients were more likely than younger diabetic patients to be adherent to self-management behaviors. The number of years diagnosed with diabetes was negatively correlated with level of exercise (ρ = -0.513, p< .01) and level of blood sugar monitoring (ρ = -.397, p< .05). Diabetic participants, who were more newly diagnosed with diabetes, were more likely to exercise and monitor their blood glucose levels than diabetics, who had been diagnosed for longer periods. Significant differences in self-management behaviors were not found for patient characteristics such as gender, race, employment status, household income, or number of persons in the household.

Perceptions of Social and Environmental Support

Table 4: Means of Amount of Support Received on Each Level

Levels of Support	N	Min.	Max.	Mean	Std. Deviation
Doctor and Health Care Team	33	2.33	5	**4.45**	0.77
Personal	36	1	5	**3.53**	0.97
Media and Policy	32	2	5	**3.51**	0.92
Worksite	21	1	5	**2.71**	1.23
Neighborhood	36	1	5	**2.53**	1.04
Community	36	1	3.67	**2.14**	0.80
Community Organizations	35	1	5	**2.11**	1.10
Family and Friends	36	1	5	**2.08**	1.08
Overall mean of all subscale levels	36	2	4.1	**2.87**	0.55

Diabetic participants perceived the greatest amount of support for their disease management from their doctors and health care team (See Table 4). Moderate support

was perceived from personal, media and policy, worksite, neighborhood support levels. Support from community, community organizations, and family and friends were perceived as being low. The overall of the perception of support from all social and environmental levels was also low.

Diabetic participants, who reported more support on one social-environmental level, were more likely to report an increased perception of support on other levels. Participants, who reported a higher perception of personal support, tended to report higher perceptions of support from both family and friends (Spearman's rho $\rho = .384$, $p < .05$) and media and policy support ($\rho = .423$, $p < .05$). Perceptions of support from family and friends was also associated with higher perceived support from community organizations (.350, $p < .05$), and worksite support (.452, $p < .05$). Diabetic participants, who reported receiving more community support, perceived more neighborhood support for disease management ($\rho = .408$, $p < .05$). Increased support from community organizations was correlated with an increased perception of worksite support ($\rho = .515$, $p < .05$). Overall, diabetic participants, who had increased perceptions of support on any level, except doctor and health care team support, reported higher levels of support on all social and environmental levels ($p < .01$).

Perceptions of support received from various social and environmental levels were not found to be related to patient characteristics. No differences in perceived support were found in relation to age, gender, race, employment status, income, or years diagnosed with diabetes.

Importance of Support on Each Level

Table 5: Means of Importance of Support on Each Level

Levels of Support	N	Min.	Max.	Mean	Std. Deviation
Doctor and Health Care Team	34	2.00	5.00	**4.59**	0.78

Personal	35	2.00	5.00	**4.34**	0.87
Family and Friends	35	1.00	5.00	**3.51**	1.42
Community Organizations	21	1.00	5.00	**3.29**	1.76
Community	36	1.00	5.00	**3.25**	1.54
Worksite	36	1.00	5.00	**2.83**	1.72
Neighborhood	36	1.00	5.00	**2.75**	1.71
Media and Policy	35	1.00	5.00	**2.66**	1.64

In the brief Chronic Illness Resources Survey one question in each subscale asked diabetic participants to rate how important they perceived support and resources for diabetes self-management from that level (See Appendix A). Having a doctor, who is willing to be an equal partner in medical decision making, is a good listener, and explains results of laboratory tests, was rated as most important by diabetic participants (Table 5). Personal disease self-management skills, such as arranging schedule to be able to care for self and reviewing disease management goals, were rated second in importance. Support from family and friends, who are willing to exercise together, share low-fat recipes, or prepare healthy food for the diabetic participant, was rated third in importance. Community organizational support, community environment, and worksite characteristics were rated moderately important for disease management. Community organizational support included attendance and participation at meetings or events such as Weight Watchers, church groups, hospital programs, wellness programs, or fitness facilities. Community environment was defined by ability to use public transportation, availability of low-fat food options at restaurants, or having parks to go to for walks or picnics. Neighborhood environment (e.g. relationships with neighbors, safe and pleasant areas to walk, and grocery stores with diabetic food options) and media and policy support (e.g. billboard or advertisements that encouraged not smoking or regular exercise and health insurance coverage) were rated least important for diabetes disease by the diabetic participants from the RFP clinic.

Diabetic participants varied significantly in their perceptions of the importance of support and resources from certain social-environmental levels by age and level of glycemic control. Younger diabetic participants tended to rate the importance of worksite support higher than older diabetic participants ($\rho = -.486$, $p < .05$). Diabetic participants with a higher HbA1c, indicating worse glycemic control, rated the importance of neighborhood resources higher than those with a lower HbA1c ($\rho = .411$, $p < .05$). Other demographic features such as age, gender, income, or years diagnosed with diabetes did not significantly influence importance ratings.

Importance x Support Ratings

Table 6: Means of Importance x Support for Each Level

Levels of Support	N	Min.	Max.	Mean	Std. Deviation
Doctor and Health Care Team	33.00	10.00	25.00	**20.68**	5.06
Personal	35.00	5.33	25.00	**15.82**	5.72
Media and Policy	32.00	2.33	25.00	**11.93**	7.21
Worksite	21.00	1.00	25.00	**9.75**	7.66
Family and Friends	35.00	1.00	25.00	**7.86**	5.88
Neighborhood	36.00	1.00	25.00	**7.81**	6.65
Community Organizations	35.00	1.00	25.00	**6.98**	7.05
Community	36.00	1.00	18.33	**6.17**	4.99

A Support x Importance scale, as described in the analysis section by the authors of the CIRS instrument, was formed for each level by multiplying the mean of the perceived support from a subscale by the diabetic participant by the importance rating of that subscale (Glasgow et al. 2000). The Support x Importance scale describes the combined perceived support and importance rating for each social environmental level. It provides another way to compare the various social environmental levels. As seen in table 5, Doctor and Health care team and personal disease management levels had the highest Support x Importance scale ratings. Community environment and community organization levels had the lowest Support x Importance ratings.

Correlations between Support on Social-Environmental Levels and Self-Management

Several significant correlations were found between the perceived support on specific social-environmental levels and the level of adherence to various self-management behaviors. Diabetic patients, who perceived more support from family and friends, had higher levels of self-management to specific diet ($\rho = .500$, $p < .01$) and foot care ($\rho = .561$, $p < .01$). Higher perceived personal disease management was correlated with higher levels of general diet ($\rho = .434$, $p < .01$), specific diet ($\rho = .497$, $p < .01$), foot care ($\rho = .341$, $p < .05$), and medication adherence ($\rho = .437$, $p < .01$). Neighborhood support was associated with and an increased level of exercise ($\rho = .542$, $p < .01$). Increased overall perceived support from all the social environmental subscales was found to be significantly correlated with increased adherence to specific diet ($\rho = .432$, $p < .01$) and foot care ($\rho = .373$, $p < .05$).

Summary

A majority of the sample population of diabetic patients from RFP clinic had an income of $30,000 or less. In this lower socioeconomic population, personal disease self-management skills, support from family and friends, neighborhood environmental support, and combined support from all social-environmental levels were found to influence self-management behaviors. Increased perceptions of support on these levels were associated with increased levels of adherence to several self-management behaviors. A significant relationship between diabetic participant perceptions of support on individual or combined social environmental levels and glycemic control (diabetic participant's HbA1C) was not found.

Chapter 5: Discussion

Implications

Self-management behaviors. The patterns and levels of self-management in diabetic participants from Regions Family Physicians (RFP) Clinic were consistent with those from previous studies involving other diabetic populations that tended to be mostly Caucasian, older, and have higher incomes (Ruggiero et al., 1997; Toobert et al., 2000). Diabetic participants from RFP clinic and in the mentioned studies most frequently followed medication regimens and blood sugar monitoring. Lower levels of self-management were reported for self-management behaviors which required lifestyle changes such as general and specific diet, foot care and regular exercise.

Few patient characteristics were found to impact self-management behaviors. Older diabetic participants from RFP clinic were more likely to follow a general diet than younger diabetic participants. This same trend has been found with previous studies that used the SDSCA measure (Ruggiero et al., 1997; Toobert et al., 2000). Diabetic participants from RFP clinic, who reported they had been diagnosed with diabetes for a greater number of years, were less likely to monitor their blood glucose and exercise. This trend was not found by other studies.

Additional differences in self-management due to patient characteristics were found by Ruggerio et al. (1997), who looked at patterns of self-management across a large population (n=2,056) of IDDN, NIDDM, and NIDDM people on insulin using the older form of the SDSCA measure. Significant differences in self-management were found for the following patient characteristics: age, working status, type of insurance coverage, and knowledge of the Diabetes Control and Complications Trial (DCCT).

Older diabetic individuals had increased levels of diet self-management and glucose testing. Employed individuals had lower levels of diet and glucose testing than retired individuals and homemakers. Those with government sponsored (Medicare/Medicaid) healthcare coverage reported higher levels of diet, glucose testing, and a trend toward increased exercise than those with HMO, private, or no insurance.

No significant differences in self-management behaviors were found between diabetics from RFP clinic with an income greater than $30,000 and those with an income less than $30,000. In a review of seven studies (n=1,988) that had used SDSCA measure by Toobert et al. (2000), no differences in self-management behaviors were found based on income. Five of the seven studies reported the income levels of diabetic participants. The mean income levels of 3 of the studies ranged from $10,000 to $29,000 in one study to $30,000 to $50,000 in another study. Two of the studies ranked the SES on a 5 point scale (1=lowest SES, 5=highest SES) and had means of 2.2 and 2.9.

Perceived Social and Environmental Support and Importance. Diabetic participants from the RFP clinic reported receiving the most support for the management of their diabetes from their doctors and health care team. Moderate support was reported for personal, media and policy, worksite and neighborhood support. Support received from community, community organizations, and family and friends was rated the lowest.

RFP clinic participants perceptions of support from social-environmental levels was similar to the perceived support reported by sixteen diabetic patients during validation of the brief CIRS instrument, except for perceived worksite support and support from family and friends (Glasgow et al., 2000). RFP participants on average reported lower levels of worksite support than the brief CIRS participants. Demographic

differences may account for the lower perception of worksite support by RFP clinic diabetics. A majority of the CIRS participants were Caucasian (94%), older (mean 63), retired (54%), and had higher incomes (69% had incomes above $30,000). The RFP diabetic participants were less likely to be Caucasian (58%), younger (53% between ages 40-59), worked full or part-time (44.5%), and had lower incomes (76.4% had incomes under $30,000, of these 38.2% had incomes less than $10,000). The fact that the RFP diabetic participants likely had lower paying jobs and were more likely to be from a minority racial or ethnic group, may explain why they would report having less flexible work hours, less diabetic accommodations, and less control over decision making and priority setting at work.

RFP diabetic participants reported receiving the lowest level of support of all the social-environmental levels from family and friends. This was an interesting finding given that the RFP diabetic participants reported support from family and friends as being very important to their disease management. The brief CIRS diabetic participants reported receiving a moderate amount of support from family and friends (Glasgow et al., 2000). The low perception of family and friend support by RFP diabetic participants may be due inflexible work hours or other community/neighborhood stresses on the family that prevent them from being supportive to disease management. This is supported by the significant finding that RFP diabetic participants who reported increased support from family and friends also reported higher levels of support from community organizations and worksite. According to Fisher et al. (1998), the family is the setting where stresses from work, financial or economic difficulties, or culture/ethnic differences have their effect. In one study of urban African Americans with 57% of participants with annual

incomes of less than $7500, interventionist were often called upon to address issues outside of traditional diabetes care such as social issues like family responsibilities (Batts et al., 2001). Other authors have stressed the need to incorporate social and family support into diabetic programs aimed at improving diabetes management in African American, Mexican American, and Latinos populations (Robbins et al., 2001; Anderson et al. 2000; Anderson et al., 1998). It is unlikely, therefore, that the low perception of support from family and friends is limited to RFP diabetic participants.

Diabetic individuals from RFP clinic most consistently rated doctor/health care team, personal support, and support from family and friends as being important for their diabetes management. Community organizations, community/neighborhood, worksite, and media and public policy were rated as being less important to diabetes management. Younger diabetes individuals tended to rate the importance of worksite support higher than older diabetic individuals. This seems intuitive since younger diabetics are more likely to be in the workforce and influenced by their workplace than older diabetics. Diabetic participants with a higher HbA1C, indicating worse control of their diabetes, were more likely to rate neighborhood support as being important. These patients may have perceived that the lack of neighborhood resources such as relationships with neighbors, safe and pleasant areas to walk, and grocery stores with diabetic food options as barriers to their diabetes management. It may be the diabetics with better control of their blood glucose have found ways to overcome barriers in their environment and, therefore, do not see these areas as being as important.

Self-management and Perceived Social and Environmental Support. Specific social-environmental levels influence the frequency of certain self-management

behaviors. Higher perceived personal support was correlated with higher levels of adherence to general diet, specific diet, foot care, and medication recommendations. According to the brief CIRS survey (Appendix A) diabetic individuals, who rated personal support higher, more frequently reviewed how they were doing with self-management goals, focused on the thing they were doing well, and took steps to rearrange their schedule to better incorporate self-management behaviors. These findings are similar to those by Aljasem et al. (2001) who found that greater self-efficacy predicted more frequent blood glucose testing, less frequent skipping of medication and binge eating, and closer adherence to diet.

Diabetic individuals from RFP who perceived receiving more support from family and friends were more likely follow recommendations for specific diet and foot care. Family and friend support was assessed in the brief CIRS (Appendix A) by how often family of friends exercised with the diabetic participant, shared healthy low-fat recipes, or helped prepare healthy foods. These findings support the claims of many previous studies about impact of support from family and friends on diabetes self-management behaviors (Albright et al., 2001; Fisher et al., 1998; Wang et al., 1996; Toljamo et al., 2001). It is interesting as previously mentioned that on average the RFP clinic diabetic participants rated their perceptions of support from family and friends the lowest of all levels of social environmental support and the importance of support for their disease management from family and friends moderately high. Since the support from families and friends is associated with adherence to self-management behaviors, findings ways to address the lack of perceived support from family and friends in the population of

diabetics at RFP and in other similar diabetic populations may be one strategy that can be employed to increase self-management in these populations.

Diabetic individuals from RFP, who reported higher levels of neighborhood support, were more likely to report they exercised regularly. Neighborhood support was the only level of social-environmental support correlated with higher levels of exercise. In the brief CIRS, neighborhood support was assessed by how frequently diabetic participants reported they had gone for walks in their neighborhood and/or had walked or done other exercise activities with their neighbors. Regular exercise is a self-management behavior that is difficult to incorporate and frequently has low levels of adherence (Ruggiero et al., 1997; Toobert et al., 2000; Anderson et al., 2003). These findings suggest that diabetics are more likely to exercise if they are in a neighborhood where they feel they can safely go for walks and feel they can walk or do other exercise activities with neighbors.

Even though health care team support and the importance of the health care team support were consistently rated the highest by RFP diabetic participants, it was not found to be significantly correlated to any self-management behaviors. Obviously, doctors and health care teams are involved in promoting self-management behaviors, however it seems that actual adoption of self-management behaviors by diabetics in the lower income population seen at RFP is more dependent on other social-environmental levels of influence. A correlation between health care team support and medication regimen adherence was found by the authors of the CIRS instrument (Glasgow et al., 2000).

Community, community organizations, and media and policy levels of social-environmental levels of support were found not to be significantly or directly correlated

with any specific self-management behaviors by RFP clinic diabetic participants. The authors of the CIRS instrument also did not find a significant direct relationship between these environmental levels of support and self-management behaviors (Glasgow et al., 2000). Despite this, impact of these levels of environmental of support on self-management behaviors remains important and appears to be more indirect. Their influence on self-management behaviors comes through their relationship with other levels of social-environmental support (personal, family and friends, and neighborhood) that are significantly correlated to self-management behaviors. Higher perceptions of personal support by RFP participants were significantly correlated to higher reported support from family and friends and media/policy support. Increased perceptions of support from family and friends were correlated with more reported support from community organizations and worksite. RFP diabetic participants who rated worksite support higher were more likely to rate support from community organizations higher. Glasgow et al. (2000) suggested that the indirect effect of these environmental levels comes through their impact on the quality of life of individuals with diabetes. According to Brody et al. (2001) community characteristics such as structural barriers (i.e. unavailable exercise facilities or public transportation), crime and violence, racism, social support, and religious involvement may indirectly influence self-management of diabetes through its impact on depression, anxiety, and family conflict.

Limitations

The results of this study need to be interpreted in light of a few limitations. According to second quarter 2003 HbA1C results from the RFP clinic, 61% (115/189) of the diabetic patients had a HbA1C of less than 8, 24% (45/189) had a HbA1C of 8 to 10,

and 15% had a HbA1C of greater than 10 (P.G.Harper, personal communication, March 19, 2004). In the sample population from RFP clinic, 66% of study participants had a HbA1C of less than 8, 22% had a HbA1C between 8 and 10, and 13% had a HbA1C greater than 10. This indicates the sample of diabetic participants in the study tended to have slightly better glycemic control than the diabetic population at RFP clinic. It is possible that these diabetic participants were also more likely to be active in self-management behaviors and experience more support for diabetes self-management than those diabetic individuals from the clinic who did not participate.

The sample of diabetic participants, who completed surveys, was small with only 36 participants. Since greater than 30 diabetics were in the sample population, about 10-12 percent of the diabetic patients at RFP clinic were included in this study. This means that the results of the study can be generalized to the diabetic population seen at RFP clinic and to other clinics with similar patient characteristics.

Due to the small sample size and the limitation of diabetic participants from the lower income community setting at RFP clinic, there was a lack of variability in patient characteristics. Therefore, relationships between patient characteristics and self-management or social-environmental support could not be fully investigated. Repeating the study with a larger diabetic population with more variation in income levels and other patient characteristics, such as such as race, income, employment status, and years diagnosed with diabetes, will be beneficial to further delineate relationships found in this study.

A majority of the questions in the survey that pertained to the demographic information where phrased in a manner that produced nominal data. This made analysis

more difficult than if the data was ordinal or continuous. It would have been more beneficial for analysis for patients to record their actual age or income than to have them select a range. Since the surveys were given anonymously, this would not have compromised the confidentiality of the diabetic participants.

Discussion

Improving adherence to diabetes self-management behaviors is essential for the prevention of diabetes complications. In the RFP clinic sample diabetic population personal self-management skills, support from family and friends, and neighborhood support were found to directly influence self-management behaviors. Other levels of social-environmental support were found to have more of an indirect influence.

Interventions that address critical social-environmental factors in diabetic patients' lives that inhibit self-management behaviors are more likely to be successful at improving adherence to self-management behaviors than those that do not (Eakin et al., 2002). The diabetic participants from RFP clinic reported receiving low levels of support from family and friends and worksite support for their diabetes self-management. Further investigating factors causing the low perceptions of support from family and friends and worksite support in the RFP clinic diabetic population may inspire new intervention strategies to improve adherence to self-management behaviors. Utilizing community resources and linking diabetic patients to inviting, safe, and affordable environments for exercise or recreation, may lead to increased levels of exercise.

Other studies have found that underserved, low-income, and ethnic minority populations face many barriers to attending group-based DSME interventions. Some of the barriers identified include lack of transportation, limited financial resources, limited

access to childcare, and dealing with substance abuse or a mental illness (Kong, 1997; Lasco, Curry, Dickson,Powers, Menes, & Merritt, 1989; Litrownik et al., 2000; Luepker et al., 1994). The use of proactive nurse phone calls and having DSME interventions in community settings have been found to be efficacious in overcoming some of these barriers (Weinberger et al., 1995; CDC, 2001).

Maintenance of self-management behaviors long-term is challenging in both low income diabetic populations as well as in more traditional diabetic populations (Norris et al, 2001; Eakin et al., 2001). At long term follow-up, usually longer than 12 months after an intervention, positive effects of traditional DSME methods tend to become non-significant (Norris et al., 2001). Several authors have suggested that the key to maintenance of outcomes depends on the development of culturally relevant interventions that take into account the multiple social-environmental levels of influence and are capable of linking patients to community self-management support resources (Jack et al., 1999; Glasgow et al., 1999). This view is further supported by a study involving the Pima Indians, which compared a structured nutrition and physical activity intervention to an unstructured intervention that emphasized the culture and lifestyle of the Pima Indians (Narayan, 1998). The participants in the culturally relevant intervention, at 12-month follow-up, demonstrated significantly better outcomes on weight and glucose tolerance than did those in the structured intervention condition.

Recommendations

In order for diabetes complications in lower income and minority populations to be reduced, more research is needed to further our understanding of specific social-environmental factors that inhibit or promote self-management behaviors in these

populations. Effective multi-level interventions, that promote, support, and provide incentives for maintenance of self-management, need to be designed to address these social-environmental factors (Eakin et al., 2002). This will require teamwork from multiple disciplines such as behavior science, epidemiology, health education, community organizations, and health care policy as well as nursing and medicine. Furthermore, a paradigm shift from the current acute care diabetes model to a chronic illness systems approach that integrates individual, family, health care, community and policy factors is recommended (Glasgow et al., 1999).

The ability to use the brief CIRS instrument to look at the influence of multiple social-environmental levels on self-management simultaneously was a strength of this research study. It would be useful in the future to repeat this study in other lower income and minority populations and in more traditional and diverse diabetes settings in order to assess if perceptions of social-environmental support are similar across various diabetic populations and if they influence self-management behaviors in a similar or different pattern. This would help clarify differences already identified when comparing the results of this research with initial findings by the authors of the CIRS instrument. Repeating the study in a larger sample population with more variability in patient characteristics would be valuable to further define the significant relationships found in this study and to identify possible undetected relationships.

This study showed that an increased perception of support on certain social-environmental levels was related to increased levels of specific self-management behaviors. As interventions are developed on various social-environmental levels in the future it may be useful to monitor their effect on perceptions of support on specific social

environmental levels and their impact on self-management behaviors using the same instruments used in this study.

A relationship was not found between self-management behaviors or perceptions of support from various social-environmental levels and glycemic control as measured by participant's HbA1C. As suggested by Glasgow et al. (2001) the effect of diabetic medications likely minimizes the existence of this relationship. In future studies looking at the effect of various social environmental levels on other diabetic outcomes such as weight, quality of life, or depression scales may be more useful.

Conclusions

Diabetes complications can be reduced with adoption of recommended self-management behaviors. Factors on multiple social-environmental levels directly and indirectly influence the adoption of self-management behaviors. In order for interventions lower income and minority populations to be effective, DSME must be combined with strategies that address individual, cultural, and social-environmental influences on adoption of self-management behaviors.

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Appendix A

Diabetes Self-Management and Social-Environmental Support Survey

Approval for this research has been obtained from:
Augsburg College Internal Review Board (Approval # 2002-43-2)
Health Partners Internal Review Board (Approval # 03-003)
and the Regions Family Physicians Clinic

Instructions

1. ***Thank you*** for you agreeing to share your experiences as a diabetic patient with us.

2. One of the questions this research is trying to answer is whether support from your family, friends, healthcare professionals, community and neighborhood has an impact on your blood sugars. A Hemoglobin A1C (HbA1C) is a test that averages your blood sugars over the past 3 months. Your name will not be included anywhere on this survey, therefore, the researchers will not be able to identify which HbA1C is yours. **Check the appropriate box below if you would be willing to share your most recent HbA1C from your *medical records*.**

   ☐ **Yes**, I give my permission for my nurse or doctor to record my most recent HbA1C from my medical records. (Let your nurse or provider know you checked "yes" so they can record your HbA1C below).

   ☐ **No**, I do not give permission for my nurse or doctor to record my most recent HbA1C from my medical records.

   HbA1C_____

   Date HbA1C was drawn_____

3. On the following pages are questions about you, the activities you do as a diabetic and about your experience of the support you have received. Please try to answer the questions *as honestly as possible*. You can include your experience today while answering the questions.

4. This survey will take approximately *15 minutes* to complete.

5. When you are finished give this survey to your nurse/doctor or hand it in at the nurses' desk.

Demographics

For each category, please circle one of the following options which best describes you:

Age	18-29	30-39	40-49	50-59	60-69	70+		
Gender	Male	Female						
Race (optional)	Caucasian	African-American	Hispanic	Asian	Native-American	Other		
Employment	Full-Time	Part-Time	Homemaker	Retired	Other			
Household Income	Less than $10,000	$10,000-29,000	$30,000-49,000	$50,000-59, 000	Greater than $60,000			
Number of persons in household	Live Alone	2	3	4	5	6	7	8	9 or more
Years Diagnosed with Diabetes	Under 1 year	1-5	6-10	11-15	16-20	21-25	>26	

Summary of Diabetes Self-Care

The questions below ask you about your diabetes self-care activities during the past 7 days. If you were sick during the past 7 days, please think back to the last 7 days that you were not sick.

Diet

1	How many of the last SEVEN DAYS have you followed a healthy eating plan?	.....0.....1.....2.....3.....4.....5.....6.....7
2	On average over the past month, how many DAYS PER WEEK have you followed your eating plan?	.....0.....1.....2.....3.....4.....5.....6.....7
3	On how many of the last SEVEN DAYS did you eat five or more servings of fruits or vegetables per day?	.....0.....1.....2.....3.....4.....5.....6.....7
4	On how many of the last SEVEN DAYS did you eat high fat foods such as red meat or full-fat dairy products?	.....0.....1.....2.....3.....4.....5.....6.....7

Exercise

5	On how many of the last SEVEN DAYS did you participate in at least 30 minutes of physical activity? (Total minutes of physical activity including walking).	.....0.....1.....2.....3.....4.....5.....6.....7
6	On how many of the last SEVEN DAYS did you participate in a specific exercise session (such as swimming, walking, biking) other than what you do around the house or as part of your work?	.....0.....1.....2.....3.....4.....5.....6.....7

Blood Sugar Testing

7	On how many of the last SEVEN DAYS did you test your blood sugar?	.....0.....1.....2.....3.....4.....5.....6.....7
8	On how many of the last SEVEN DAYS did you test your blood sugar the number of times recommended by your health care provider?	.....0.....1.....2.....3.....4.....5.....6.....7

Foot Care

9	On how many of the last SEVEN DAYS did you check your feet?	.....0.....1.....2.....3.....4.....5.....6.....7
10	On how many of the last SEVEN DAYS did you inspect the inside of your shoes?	.....0.....1.....2.....3.....4.....5.....6.....7

Smoking

11	Have you smoked a cigarette –even one puff- during the past SEVEN Days	No Yes *If yes*, how many cigarettes did you smoke on an average day? Number of cigarettes:_____

Medications

12	On how many of the last SEVEN DAYS did you take you recommended diabetes medication?	.....0.....1.....2.....3.....4.....5.....6.....7

Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The Summary of Diabetes Self-Care Activities Measure. *Diabetes Care*, 23, 943-950.

The Chronic Illness Resources Survey

Managing diabetes can be time-consuming and challenging. It can involve taking medicine daily, exercising, following a specific diet, regular doctor visits, and coping with the impact of the illness upon you and those with whom you interact. The following questions ask about a variety of different resources that people may use to manage their diabetes. For each item, **circle the number that best indicates your experience** *over the* **past 3 months.**

Doctor and Health Care Team

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
1	Has your doctor involved you as an equal partner in making decisions about illness management strategies and goals?	1	2 3 4	5
2	Has your doctor or other health care advisor listened carefully to what you had to say about your illness?	1	2 3 4	5
3	Has your doctor or other health care provider thoroughly explained the results of test your have had done (e.g., cholesterol, blood pressure, HbA1C, or other laboratory test)?	1	2 3 4	5
4	How important are *health care team resources* to you in managing your illness?	1	2 3 4	5

Family and Friends

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
5	Have family or friends exercised with you?	1	2 3 4	5
6	Have you shared healthy low-fat recipes with friends or family members?	1	2 3 4	5
7	Family or friend bought food or prepared food for you that was especially healthy or recommended?	1	2 3 4	5
8	How important is *family and friend* support in managing your illness?	1	2 3 4	5

Personal (helpful things you did for yourself)

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
9	Have you focused on the thing you did well to manage your illness instead of those you did not?	1	2 3 4	5
10	Have you thought about or reviewed how you were doing in accomplishing your disease management goals?	1	2 3 4	5
11	Have you arranged your schedule so that you could more easily do the things you needed to do for your illness?	1	2 3 4	5
12	How are important are *personal* things, like those above, that you do for yourself, in managing your illness?	1	2 3 4	5

Neighborhood

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
13	Have you walked or exercised outdoors in your neighborhood?	1	.....2.....3.....	.....4.....5
14	Have you walked or done other exercise activities with neighbors?	1	.....2.....3.....	.....4.....5
15	How **important** are *neighborhood* resources (e.g. relationships with neighbors, safe and pleasant areas to walk, or grocery stores with diabetic food options) in managing your illness?	1	.....2.....3.....	.....4.....5

Community

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
16	Have you eaten at a restaurant that offered a variety of tasty, low-fat food choices?	1	.....2.....3.....	.....4.....5
17	Have you used public transportation to get somewhere you were going?	1	.....2.....3.....	.....4.....5
18	Have you gone to parks for picnics, walks, or other outings?	1	.....2.....3.....	.....4.....5
19	How **important** is *community environment* (e.g. accepting people, diabetic related events, or public transportation) to you in managing your illness?	1	.....2.....3.....	.....4.....5

Media and Policy

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
19	Have you had health insurance that covered alternative therapies such a chiropractors and naturopaths?	1	.....2.....3.....	.....4.....5
20	Have you had health insurance that covered most of the costs of your medical needs including medicine and diabetic supplies?	1	.....2.....3.....	.....4.....5
21	Have you seen billboards or other advertisements that encouraged not smoking, low-fat eating, or regular exercise?	1	.....2.....3.....	.....4.....5
22	How **important** are *media and policy* resources (like those mentioned above) to you in managing your illness?	1	.....2.....3.....	.....4.....5

Community Organizations

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
23	Have you attended free or low-cost meetings (for example, Weight Watchers, church groups, hospital programs) that supported you in managing your illness?	1	.....2.....3.....4	5
24	Have you volunteered your time for local organizations or causes?	1	.....2.....3.....4	5
25	Have you attended wellness programs or fitness facilities?	1	.....2.....3.....4	5
26	How **important** are *community and health organizations* like those mentioned above to you in managing your illness?	1	.....2.....3.....4	5

Work (If you are *not* currently employed, skip section)

Over the **past 3 months**, to what extent……..

		Not at All	A moderate amount	A great deal
27	Have you had a flexible work schedule that you could adjust to meet your needs?	1	.....2.....3.....4	5
28	Has your workplace had rules or policies that made it easier for you to manage your illness (such as no smoking rules or time off work to exercise)?	1	.....2.....3.....4	5
29	Have you had control over your job in terms of making decisions and setting priorities?	1	.....2.....3.....4	5
30	How **important** are *worksite support and resources* to you in managing your illness?	1	.....2.....3.....4	5

Glasgow, R. G., Strycker, L. A., Toobert, D. J., & Eakin, E. (2000). A Social-Ecologic Approach to Assessing Support for Disease Self-Management: The Chronic Illness Resources Survey. *Journal of Behavioral Medicine*, 23, 559-583.

***Thank you for finishing this survey. Please give your survey to your nurse or leave it at the nurses' station.**

Appendix B

DO YOU SEE DIABETIC PATIENTS?

ATTENTION: PROVIDERS AND NURSES

Hi, my name is Cheryl McKee. I am a Masters student at the Augsburg College Physician Assistant program. For my thesis I will be working with Peter G. Harper, MD and surveying diabetic patients at Regions Family Physicians Clinic to see how the support of health professionals, family, friends and community influences how frequently they engage in diabetic self-care activities and their glycemic control.

I. What will the diabetic patients be asked to do?
Diabetic patients will be asked to complete an anonymous survey that has questions about demographic features, how frequently they do diabetic self-care activities, and the social and environmental support they have found helpful in the management of their diabetes. The survey will take approximately 15-20 minutes to complete.

II. What is your role?
Tell your diabetic patients, who are over the age of 18 and English literate, about this research and invite their participation. Briefly go through with them the patient information sheet and answer any questions they might have. A script of information you should share with them will be attached to envelopes containing the surveys.
Along with the survey I am collecting the most recent HbA1C values of diabetic participants. If a diabetic participant on the second page of the survey checks the box next to "yes", this indicates that they have given you permission to record their most recent HbA1C value from their medical record.

III. How will this research benefit Ramsey Family Physicians?
This research will provide valuable insight into the support diabetic patients at Regions Family Physicians Clinic experience from their families, friends, healthcare providers and community and how this impacts the how well they manage their diabetes and maintain glycemic control. The research findings of this study will be useful for identifying how diabetes care at RFP and elsewhere can be improved from a clinical and a community perspective.

IV. Who can I contact with question?
You can contact me or Dr. Peter Harper with any questions:
Cheryl McKee's phone: (612)-330-1399
email address: mckeec@augsburg.edu
Dr. Peter Harper's Phone: 651-772-9757
email address: PeterG.Harper@HealthPartners.com

Provider/Nurse Script

I. Introduction

You have been invited to be in a research study that examines the relationship between daily activities used to manage your diabetes and the support you have received from your doctor, family and community. You have been selected to participate since you are a diabetic patient at Regions Family Physicians Clinic and are 18 years or older. This research is being conducted by Dr Peter G. Harper, a physician at RFP clinic and Cheryl McKee, a student from the Augsburg Physician Assistant program as part of her Master's thesis.

- Your participation in this research will have the potential of improving your diabetic care in the future at Regions Family Physicians and elsewhere.

- Your decision to participate or not will in no way affect your relationship with your provider, your insurance, or the diabetic care you receive from Regions Family Physicians Clinic.

1. **Ask patient if they are interested?**

2. **If yes, have patient read through patient information, which is composed of these areas:**
   - Procedures or tasks patient will be asked to complete
   - Risks and benefits
   - Confidentiality
   - Voluntary nature of the study
   - Contacts
   - Statement of Consent
3. **Ask patient if they understand what tasks are involved to participate.**
   - If you are doubtful the patient understands, ask them further questions to clarify whether or not the instructions have been properly understood.

4. **Determine if patient is willing to share HbA1C**
   - If pt has checked box next to "yes", fill in their most recent HbA1C value from their medical record.

5. **Collect Surveys from patients and put in collection box at nurses desk.**

PATIENT INFORMATION FORM

The Influence of Social-environmental Support on Diabetes Self-management and Glycemic Control

You are invited to be in a research study that examines the relationship between daily activities used to manage your diabetes, such as eating right or checking your feet, and the support you have received from your doctor, family members, and community. You were selected as a possible participant because you are a diabetic patient at Regions Family Physicians clinic. We ask that you read this form and ask any questions you may have before agreeing to be in this study.

This study is being conducted by Cheryl McKee as part of her master's thesis in Physician Assistant Studies at Augsburg College and by Peter G. Harper, a physician at Regions Family Physicians Clinic.

Background Information:
Several studies have suggested that diabetics who have social support from health professionals, family, and friends tend to take better care of themselves through eating right, exercising, and monitoring their blood glucose. Few studies have looked how support from community organizations, neighborhood environments, media, or workplace can help diabetics manage their disease. The purpose of this study is to learn about the support diabetics, like you, experience from family, friends, health professionals, community organizations, neighborhood environments, media, or workplace, and how this support helps diabetics manage their diabetes on a daily basis.

Procedures:
If you agree to be in this study, you will be asked to do the following:

1) In order to get an estimate of your blood glucose control, you will be asked if you are willing to share your most recent Hemoglobin A1C (HbA1C) lab value. This value will give us an estimate of your blood glucose control over the last three months. If you check the "yes" box, your doctor or nurse will write down your most recent HbA1C value.

2) Complete a survey, which normally takes about 15 minutes.

Risks and Benefits of Being in this Study:
There are no risks associated with your participation in this study. There are also no direct benefits to participation such as money or gifts.

The information provided by this research may help health care professionals better understand your needs for support as a diabetic patient and may lead to the development of new programs through the clinic or in your community that will benefit many individuals with diabetes.

Confidentiality:

The information you share as part of this study will be kept private. Your name and any information that could identify you will be absent from the survey and the page on which your provider will write your HbA1C lab value.

Voluntary Nature of the Study:
Your decision whether or not to participate will not affect your current or future relations with the Augsburg College or the Regions Family Physicians Clinic. Your insurance and medical care at Regions Family Physicians Clinic will in no way be affected by participation. If you agree to participate, you are still free to withdraw at any time by not returning the survey. You may refuse to have your HbA1C recorded.

Contacts and Questions:
The researchers conducting this study are Peter G. Harper, MD and Cheryl McKee, who is an Augsburg Physician Assistant student. If you have questions or comments following completion of the study, you may contact any of us.

Cheryl McKee
Phone: (612)-330-1399
Email: mckeec@augsburg.edu.

Peter G. Harper MD, MPH
Phone: 651-772-9757
PeterG.Harper@HealthPartners.com

Chris Bosquez MPAS, PA-C
Phone: (612)-330-1519
Email: bosquez@augsburg.edu

Approval for this research has been obtained from:
Augsburg College Internal Review Board (Approval # 2002-43-2)
Health Partners Internal Review Board (Approval # 03-003)
and the Regions Family Physicians Clinic

Appendix E

Date: Thu, 18 Jul 2002 19:57:26 -0700
From: Deborah Toobert <Deborah@ori.org>
To: 'mckeec' <mckeec@augsburg.edu>
Cc: Melda DeSalvo <Melda@ori.org>
Subject: RE: Augsburg Physician Assistant Student

Dear Cheryl,

You are welcome to use the Summary of Diabetes Self-Care measure in your work. Dr. Glasgow and I have not continued to use the DFBC, as we have moved on to other ways to measure family, as well as other proximal and more distal forms of support. Our newest instrument is called the Chronic Illness Resources Inventory. If you are interested in this new measure please reply to Melda DeSalvo, and she will send you our recent paper validating this instrument, as well as the actual instrumnet.

-----Original Message-----
From: mckeec [mailto:mckeec@augsburg.edu]
Sent: Thursday, July 18, 2002 12:00 PM
To: deborah@ori.org
Subject: Augsburg Physician Assistant Student

Deborah J. Toobert, PhD
Oregon Research Institute
1715 Franklin Blvd.
Eugene, OR 97403-1983
Email: Deborah@ori.org

Dear Deborah,
My name is Cheryl McKee and I am a physician assistant student at the Augsburg
PA program. This summer I am working on developing my research proposal for

my master thesis. My developed research question this far is, "How does supportive family behaviors relate to psychosocial adjustment and adherence to
diabetes self-care in adults with Type 2 diabetes". As I was working on my literature search, I came across the two journal articles written by you and/or you associates. The first was titled, "The Summary of Diabetes Self-Care Activities Measure" (Diabetes Care, Volume 23, Number 7, July 2000).
My advisor and I were very impressed by this revised measure and would like

your permission to use this as a research tool to measure adherence to self-care activities for those diabetics we survey.

The second journal article was titled, "Social Environment and Regimen

Adherence Among Type II Diabetic Patients" (Diabetes Care Vol. 11, NO. 5, May
1988). In this article Russell E. Glasgow and you talked about the revised version of the Diabetes Family-Behavior Checklist (DFBC-II). The finding that
regimen-specific measures of family support differentiate the adherence of subjects better than global family support scores sparked my interest in the

scale. I would like to know more about how you might simplify this measure if
you were to use it again and if the revised measure has been used in any other
research studies.

Thank in advance for responding. I look forward to hearing from you and am open to any insight or suggestions you might have. I am most easily reached

via email or feel free to call my cell phone.

Sincerely,
Cheryl L. McKee
691 Oakdale Ave.
St. Paul, MN 55107
Email: mckeec@augsburg.edu
Cell Phone:(651)-285-3643

Appendix F

Institutional Research Board
Augsburg College
Box 107

December 9, 2002

To: Cheryl Lynn McKee

From: Norma C. Noonan, Chair

I am pleased to inform you that the IRB has approved your application the project: Influence of Social-Environmental Support on Diabetic Self-Management and Glycemic Control.

_____ as submitted

__X__ as revised

_X_ with the following conditions:

Please use the departmental phone number, rather than a personal phone number, for inquiries.

Your IRB approval number which should be noted in your written project and in any major documents alluding to the research project is as follows:

2002-43-2

I wish you success with your project. If you have any questions, you may contact me: 612-330-1198 or noonan@augsburg.edu.

c. Professor Chris Bosquez

HealthPartners®
Research Foundation

Institutional Review Board
Mail Stop: 11503H
640 Jackson Street
St. Paul, MN 55101
(651) 254-3391
www.healthpartners.com

February 21, 2003

Peter Harper, MD
Ramsey Family Physicians Clinic

RE: #03-003 – "The Influence of Social and Environmental Support on Diabetes Self-Management"

The Health Services Research Sub-Committee (HSRS) reviewed the above referenced application and the IRB reviewed the above referenced project through its Expedited Review Procedures. The HSRS approved the project with suggestions and stipulations and the IRB has approved the project with stipulations.

HSRS Review: The question is extremely important since it directly addresses the context in which patients with diabetes attempt to manage the disease – both in collaboration with their care givers as well as the broader context of family, community and environment. This study will provide insight in patient-centered information that will be potentially very useful in identifying points for improvement in care that go beyond clinical care, and may have an influence on a large number of patients simultaneously. This study appears to be well-thought out. The study uses good survey instruments, has a solid foundation couched in the literature and addresses an important issue in health care today. Two issues of concern are 1) the lack of power analysis in the statistical design. The sample size of 30 may not be adequate to make generalizations but may provide some useful pilot information for future use; and 2) the storage of data in the home of the investigator may violate data privacy laws.

HSRS Suggestions:
1) In the Chronic Illness Resources Survey clarify whether or not the patient's experience that day is to be considered in responding to the survey.
2) Add Dr. Harper as an investigator to the second paragraph of the consent form.

HSRS Stipulations:
1) Original data and consent forms should be stored at the clinic or at HPRF. A copy of non-identifiable data may be made for data entry.
2) Provide a letter of support from the clinic which states that the clinic agrees to contribute the effort of clinic staff to perform study responsibilities.

IRB Review:
The IRB reviewer had the most concerns regarding confidentiality and the consenting process. Unless there is a need to connect a specific patient with their lab level, a waiver of documentation of consent could be applied to your project. The consent form could be made into a statement that would not need to be signed by the subject. The permission form you submitted could be modified and included as a last item on the survey. A yes or no checkboxes could be added so that the patient could indicate whether they agreed to have the nurse enter the number or not.

Please direct your response to the CRS stipulations to me at your earliest convenience. You will subsequently be notified of final approval. If your response is not received within **60 days,** the study will be filed "inactive". If you have any questions, please call me at 651-254-3391.

Bobette K. Godding
Manager, Office of Research Subjects

HealthPartners®
Research Foundation

Institutional Review Board
Mail Stop: 11503H
640 Jackson Street
St. Paul, MN 55101
(651) 254-3391 Phone
(651) 254-3837 Fax

May 2, 2003

Peter Harper, MD
Ramsey Family Physicians Clinic

RE: #03-003 – "The Influence of Social and Environmental Support on Diabetes Self-Management"

Thank you for your recent submission in response to stipulations regarding the above referenced study. Your response has been reviewed by the HSRS and the IRB and is in compliance with their requirements.

The IRB has amended their review and granted a waiver of documentation of consent and waiver of authorization based on the new materials submitted in your letter of April 9, 2003.

The above "project number" has been assigned to your research. That number, along with the title of your study, must be used in communication with the IRB.

Any changes or modifications to the approved protocol require the prior approval of the Institutional Review Board (IRB). This includes protocol amendments, study materials, changes in numbers of subjects, etc. All subjects enrolled must fulfill all protocol criteria; any exceptions must have prior approval by the IRB. If you have questions regarding the interpretation of this policy please do not hesitate to call me. Explanations concerning deviations from the approved protocol must be forwarded to the IRB for review.

Based on the content of this study and your explanation of the potential risks to subjects, **the IRB has approved this study for a period of 12 months. A Progress Report form will be due for submission in JANUARY 2004.**

Best wishes on the study!

Bobette K. Godding
Manager, Office of Research Subjects